UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,311	06/27/2003	Michael Yatziv	82225P8511	8941

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EXAMINER
KROFCHECK, MICHAEL C

ART UNIT	PAPER NUMBER
2186	

DATE MAILED: 09/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	10/608,311	YATZIV ET AL.
	Examiner	Art Unit	
	Michael Krofcheck	2186	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 July 2006*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 June 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date *7/12/06*.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1.   This office action is in response to the amendment filed on 7/12/2006.

2.   Claims 1-3, 6, 7, 9, 10-12, 15, 16, 18-21, 24, 25, 27 have been amended.

3.   The objections/rejections from the prior correspondence not restated herein have

been withdrawn.

Terminal Disclaimer

4.   The terminal disclaimer filed on 7/12/2006 disclaiming the terminal portion of any

patent granted on this application which would extend beyond the expiration date of any

patent granted on application number 10/607,770 has been reviewed and is accepted.

The terminal disclaimer has been recorded.

Claim Rejections - 35 USC § 112

5.   The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6.   Claims 9, 18, and 27 are rejected under 35 U.S.C. 112, first paragraph, as failing

to comply with the written description requirement. The claim(s) contains subject matter

which was not described in the specification in such a way as to reasonably convey to

one skilled in the relevant art that the inventor(s), at the time the application was filed,

had possession of the claimed invention.

The examiner has not seen any indication of determining a number of physical data storage blocks based upon overhead in the applicant's specification. Figure 2 shows this happening with regard to the physical data storage parcels as it was claimed prior to the amendment.

Claim Rejections - 35 USC § 103

7.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8.   The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1.   Determining the scope and contents of the prior art.
2.   Ascertaining the differences between the prior art and the claims at issue.
3.   Resolving the level of ordinary skill in the pertinent art.
4.   Considering objective evidence present in the application indicating obviousness or nonobviousness.

9.   Claims 1-3, 6-7, 10-12, 15-16, 19-21, 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable by Jacobson et al., U.S. Patent Application Publication No. 2004/0068636 (hereinafter Jacobson) which incorporates Jacobson et al., U.S. Patent No. 5,392,244 (hereinafter Jacobson 2) by reference, Ooe et al., US patent 5737743, and English et al., US patent 5345575.

10.   With respect to claim 1, Jacobson teaches of a method comprising: creating a virtual data storage parcel (Figs. 1, 2; paragraphs 0020, 0024; where the controller is arranged to create a virtual storage space. The virtual storage space includes a plurality of virtual storage volumes (virtual data storage parcel)),

the virtual data storage parcel including a number of virtual logical data blocks of a first size (Fig. 2; paragraph 0031; where the blocks in the virtual storage locations include 512 bytes of data);

creating a physical data storage parcel (Fig. 2; paragraph 0024; where the physical storage space includes a plurality of physical storage volumes (physical storage parcel). The physical storage volumes are present; therefore they have been created),

the physical data storage parcels including a number of data blocks of a second size (Fig. 2; paragraph 0031; where the blocks in the physical storage locations include 512 bytes of data); and

mapping the virtual logical data blocks in the virtual data storage parcel to the physical data storage blocks in the physical storage parcel (Figs. 1, 2; paragraph 0029).

Jacobson fails to explicitly teach of the second size being smaller than the first size. However, Ooe teaches of a logical block size is an integer multiple of a physical block (abstract).

Jacobson fails to explicitly teach of the larger size of the virtual logical data blocks provides additional storage space for data of one or more types including at least one of error correction code data, cyclic redundancy check data, checksum data,

timestamp data, and cache history data. However, English teaches of wherein the larger size of the virtual logical data blocks provides additional storage space for data of one or more types including at least one of error correction code data, cyclic redundancy check data, checksum data, timestamp data, and cache history data (fig. 3c; column 3, lines 19-26; where the packet (logical block) contains a block of data (physical block), sequence number (timestamp), and a flag).

It would have been obvious to one of ordinary skill in the art having the teachings of Jacobson incorporating Jacobson 2 and Ooe at the time of the invention to make the logical block size of Jacobson an integer multiple of a physical block size as taught in Ooe. Their motivation would have been to reduce the seek count and rotation wait time for the disk (Ooe, column 3, lines 7-11).

It would have been obvious to one of ordinary skill in the art having the teachings of Jacobson incorporating Jacobson 2, Ooe, and English at the time of the invention to include the sequence number/timestamp and flag from the packet of English into the logical block of the combination of Jacobson incorporating Jacobson 2 and Ooe. Their motivation would have been to allow for recovery from system failures and provide for atomic updates of objects (English, column 3, lines 23-26).

11. With respect to claim 2, Jacobson also teaches of, the method further comprising: storing data pertaining to the virtual data storage parcel in one or more of the physical data storage blocks in the physical data storage parcel (Fig. 2; paragraph 0030; where the host request to write addresses a storage location of a virtual storage

volume, and a pointer contains the location in the physical storage location which contains the data written by the host)

wherein a size of the physical data storage parcel exceeds the size of the virtual data storage parcel (Fig. 2; paragraphs 0024, 0031; where the depicted number of volumes which show 5 physical volumes and 3 virtual volumes can be more or less).

12.   With respect to claim 3, Jacobson also teaches of wherein data pertaining to the physical data storage parcel includes data of one or more types selected from a list consisting of error correction code data, cyclic redundancy check data, checksum data, timestamp data and cache history data (Fig. 1; paragraph 0022; where the controller uses a RAID 5DP (double parity) storage scheme to store the data. Jacobson 2, Figs. 1, 3; column 3, line 61 – column 4, line 31; where parity data (error correction code data) is stored in one of the 4 physical disks).

13.   With respect to claim 10, Jacobson teaches of a data storage system comprising: a storage medium (Fig. 1, item 14; paragraph 0019);

a processing system (Fig. 1, item 12; paragraph 0020); and

a memory, coupled to the processing system (Fig. 1, item 18; paragraph 0023),

the memory having stored therein instructions which, when executed by the processing system, cause the processing system to create a virtual data storage parcel (Figs. 1, 2; paragraph 0020, 0023 – 0024; where the memory stores executable code usable by the controller. The controller is arranged to create a virtual storage space. The virtual storage space includes a plurality of virtual storage volumes (virtual data storage parcel)),

the virtual data storage parcel including a number of virtual logical data storage

blocks of a first size (Fig. 2; paragraph 0031; where the blocks in the virtual storage

locations include 512 bytes of data),

create a physical data storage parcel (Fig. 2; paragraph 0024; where the physical

storage space includes a plurality of physical storage volumes (physical storage parcel).

The physical storage volumes are present; therefore they have been created),

the physical data storage parcel including a number of physical data storage

blocks of a second size (Fig. 2; paragraph 0031; where the blocks in the physical

storage locations include 512 bytes of data), and

map the virtual logical data storage blocks in the virtual data storage parcel to the

physical data storage blocks in the physical data storage parcel (Figs. 1, 2; paragraph

0020, 0029).

Jacobson fails to explicitly teach of the second size being smaller than the first

size. However, Ooe teaches of a logical block size is an integer multiple of a physical

block (abstract).

Jacobson fails to explicitly teach of the larger size of the virtual logical data

blocks provides additional storage space for data of one or more types including at least

one of error correction code data, cyclic redundancy check data, checksum data,

timestamp data, and cache history data. However, English teaches of wherein the

larger size of the virtual logical data blocks provides additional storage space for data of

one or more types including at least one of error correction code data, cyclic

redundancy check data, checksum data, timestamp data, and cache history data (fig.

3c; column 3, lines 19-26; where the packet (logical block) contains a block of data (physical block), sequence number (timestamp), and a flag).

14.   With respect to claim 11, Jacobson also teaches of wherein the instructions, when executed by the processing system, further cause the processing system to: store data pertaining to the virtual data storage parcel in one or more of the physical data storage blocks in the physical data storage parcel (Fig. 2; paragraphs 0020, 0023, and 0030; where the host request to write addresses a storage location of a virtual storage volume, and a pointer contains the location in the physical storage location which contains the data written by the host),

wherein a size of the physical data storage parcel exceeds the size of the virtual data storage parcel (Fig. 2; paragraphs 0024, 0031; where the depicted number of volumes which show 5 physical volumes and 3 virtual volumes can be more or less).

15.   With respect to claim 12, Jacobson also teaches of wherein data pertaining to the physical data storage parcel includes data of one or more types selected from a list consisting of error correction code data, cyclic redundancy check data, checksum data, timestamp data and cache history data (Fig. 1; paragraph 0022; where the controller uses a RAID 5DP (double parity) storage scheme to store the data. Jacobson 2, Figs. 1, 3; column 3, line 61 – column 4, line 31; where parity data (error correction code data) is stored in one of the 4 physical disks).

16.   With respect to claim 19, Jacobson teaches of a machine-readable medium containing instructions (Fig. 1; paragraph 0023) which, when executed by a processing system, cause the processing system to perform a method, the method comprising:

creating a virtual data storage parcel (Figs. 1, 2; paragraphs 0020, 0024; where the controller is arranged to create a virtual storage space. The virtual storage space includes a plurality of virtual storage volumes (virtual data storage parcel)),

the virtual data storage parcel including a number of virtual logical data storage blocks of a first size (Fig. 2; paragraph 0031; where the blocks in the virtual storage locations include 512 bytes of data);

creating a physical data storage parcel (Fig. 2; paragraph 0024; where the physical storage space includes a plurality of physical storage volumes (physical storage parcel). The physical storage volumes are present; therefore they have been created),

the physical data storage parcel including a number of physical data storage blocks of a second size (Fig. 2; paragraph 0031; where the blocks in the physical storage locations include 512 bytes of data); and

mapping the virtual logical data storage blocks in the virtual data storage parcel to the physical data storage blocks in the physical data storage parcel (Figs. 1, 2; paragraph 0029).

Jacobson fails to explicitly teach of the second size being smaller than the first size. However, Ooe teaches of a logical block size is an integer multiple of a physical block (abstract).

Jacobson fails to explicitly teach of the larger size of the virtual logical data blocks provides additional storage space for data of one or more types including at least one of error correction code data, cyclic redundancy check data, checksum data,

timestamp data, and cache history data. However, English teaches of wherein the larger size of the virtual logical data blocks provides additional storage space for data of one or more types including at least one of error correction code data, cyclic redundancy check data, checksum data, timestamp data, and cache history data (fig. 3c; column 3, lines 19-26; where the packet (logical block) contains a block of data (physical block), sequence number (timestamp), and a flag).

17.   With respect to claim 20, the combination of Jacobson incorporating Jacobson 2 and Ooe teaches all of the limitations of the parent claim as discussed supra. Jacobson also teaches of wherein the method further comprising: storing data pertaining to the virtual data storage parcel in one or more of the physical data storage blocks in the physical data storage parcel (Fig. 2; paragraph 0030; where the host request to write addresses a storage location of a virtual storage volume, and a pointer contains the location in the physical storage location which contains the data written by the host);

wherein a size of the physical data storage parcel exceeds the size of the virtual data storage parcel (Fig. 2; paragraphs 0024, 0031; where the depicted number of volumes which show 5 physical volumes and 3 virtual volumes can be more or less).

18.   With respect to claim 21, the combination of Jacobson incorporating Jacobson 2 and Ooe teaches all of the limitations of the parent claim as discussed supra. Jacobson also teaches of wherein data pertaining to the physical data storage parcel includes data of one or more types selected from a list consisting of error correction code data, cyclic redundancy check data, checksum data, timestamp data and cache history data (Fig. 1; paragraph 0022; where the controller uses a RAID 5DP (double parity) storage

scheme to store the data. Jacobson 2, Figs. 1, 3; column 3, line 61 – column 4, line 31; where parity data (error correction code data) is stored in one of the 4 physical disks).

19.   With respect to claims 6, 15, and 24, the combination of Jacobson incorporating Jacobson 2 and Ooe teaches all of the limitations of the parent claims as discussed supra. Jacobson 2 teaches of wherein the virtual data storage parcel includes less virtual logical data blocks than the physical data storage parcel (column 7, lines 59 – 64).

Jacobson fails to specifically teach of eight virtual logical data blocks and nine data storage blocks.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use eight virtual logical data blocks and nine physical logical data storage blocks since it has been held that relative dimensions are not patentably distinct. *Gardner v. TEC Systems, Inc.*, 220 USPQ 777 (Fed. Cir. 1984). In addition, the applicant states in paragraph 0018 and 0019 that the number of data blocks in the physical and virtual data storages parcels may vary.

20.   With respect to claims 7, 16, and 25, the combination of Jacobson incorporating Jacobson 2 and Ooe teaches all of the limitations of the parent claims as discussed supra. Jacobson also teaches of wherein the nine physical data storage blocks are each 512 bytes in length (paragraph 0031; where the blocks of the physical storage system comprise 512 bytes of data).

21.   Claims 4, 13, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable
over Jacobson incorporating Jacobson 2, Ooe, English, and Peterson et al., U.S. Patent
No. 5,911,150 (hereinafter Peterson).

With respect to claims 4, 13, and 22, Peterson teaches of wherein each virtual
logical data block includes system data as well as data pertaining to the system data of
the respective virtual logical data block (Figs. 10, 11; column 6, lines 10 – 33; where the
Host Block Header (system data) and logical block data (data pertaining to the system
data) make up a logical block).

It would have been obvious to one of ordinary skill in the art having the teachings
of Jacobson, Jacobson 2, Ooe, English and Peterson at the time of the invention to
incorporate the Host Bock Header from the logical blocks of Peterson into the virtual
storage blocks of the combination of Jacobson incorporating Jacobson 2, Ooe, and
English. The motivation for this would have been to separate and define the logical
blocks (Peterson, column 6, lines 10 – 22).

22.   Claims 5, 14, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable
over Jacobson incorporating Jacobson 2, Ooe, English, and Peterson as applied to
claims 4, 13, and 22 respectively, and further in view of Itoh et al., U.S. Patent No.
5,966,720 (hereinafter Itoh).

With respect to claims 5, 14, 23, Itoh teaches of wherein the data pertaining to
the virtual logical data block includes data of one or more types of data selected from
the list consisting of error correction code data, cyclic redundancy check data,
checksum data, timestamp data and cache history data (Fig. 1; column 2, lines 60 – 62;

column 3, lines 14 – 23; where the sectors within each block are addressed by logical

addresses assigned to them and not their physical address. When data is written to the

sectors, cyclic redundancy check data is also written into each sector).

It would have been obvious to one of ordinary skill in the art having the teaching

of Jacobson incorporating Jacobson 2, Ooe, English, Peterson, and Itoh at the time of

the invention to include the cyclic redundancy check data from Itoh in the virtual blocks

of the combination of Jacobson incorporating Jacobson 2, Ooe, English, and Peterson.

The motivation for this would have been to enable correction of the error in 1 bit and the

detection of the error in 2 bits (Itoh, column 3, lines 22 – 24).

23.   Claims 8, 17, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Jacobson incorporating Jacobson 2, Ooe, English, and Cleveland et al., U.S.

Patent No. 5,325,370, (hereinafter Cleveland).

24.   With respect to claim 8, 17, 26, Cleveland teaches of wherein the size of each

virtual logical data block varies within a data storage system (Fig. 9; column 8, lines 29

– 47; where the data blocks are logical entities (virtual logical data blocks) which may

have different lengths).

It would have been obvious to one of ordinary skill in the art having the teachings

of the combination of Jacobson incorporating Jacobson 2, Ooe, and English, and

Cleveland at the time of the invention to incorporate the variable logical data block sizes

from the virtual storage of Cleveland to virtual bock sizes in the virtual storage system of

the combination of Jacobson incorporating Jacobson 2, Ooe, and English.   The

motivation for this would have been to more efficiently store data in the system (Cleveland, column 1, line 65 – column 2, line 1, column 2, line 59 – column 3, line 11).

25.   Claims 9, 18, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jacobson incorporating Jacobson 2, Ooe, and English.

26.   With respect to claim 9, 18, 27, English teaches of determining a number of physical data storage blocks based upon consideration of size overhead and performance overhead (column 3, lines 27-41; where an amount of reserve storage is available for future allocation to ensure that a storage location is always available. This directly relates to the number of physical blocks. The reserve amount when 5% allows for through put of half the nominal bandwidth, while at a reserve of 50%, the speed approaches the nominal bandwidth).

It would have been obvious to one of ordinary skill in the art having the teachings of Jacobson incorporating Jacobson 2, Ooe and English at the time of the invention to incorporate the process of maintaining a variable reserve of physical blocks as taught in English into the combination of Jacobson incorporating Jacobson 2, Ooe, and English. The motivation for this would have been to provide better performance and ensure that there is always available storage (English, column 3, lines 27-41).

Response to Arguments

27.   Applicant's arguments with respect to claims 1-27 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

28.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.
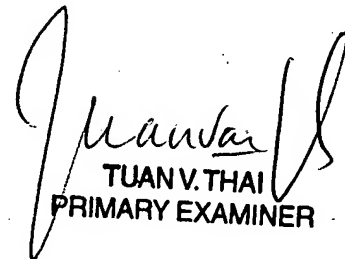
29.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Krofcheck whose telephone number is 571-272-8193. The examiner can normally be reached on Monday - Friday.

30.   If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Kim can be reached on 571-272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

31.   Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Michael Krofcheck

TUAN V. THAI
PRIMARY EXAMINER